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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/274,935	03/23/1999	KATHLEEN L. COVERT	EN997064	9143

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EXAMINER

MARKOFF, ALEXANDER

ART UNIT

PAPER NUMBER

1746

DATE MAILED: 12/04/2001

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/274,935

Applicant(s)

COVERT ET AL.

Examiner

Alexander Markoff

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2001.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5, 6, 8, 9 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 5-148,658.

JP 5-148,658 teaches a method for cleaning copper comprising application to copper surfaces of microelectronic packages a cleaning solution as claimed.

The cleaning solution comprises an inorganic acid(s) as claimed – sulfuric, phosphoric, etc.

The cleaning solution comprises persulfate salt as claimed – ammonium persulfate.

The solution comprises a phosphate salt, which, at the same time, a surfactant.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 5-148,658.

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JP 5-148,658 teaches a method for cleaning copper comprising application to copper surfaces of microelectronic packages a cleaning solution as claimed.

The cleaning solution comprises an inorganic acid(s) as claimed – sulfuric, phosphoric, etc.

The cleaning solution comprises persulfate salt as claimed – ammonium persulfate.

The solution comprises a phosphate salt, which, at the same time, a surfactant.

JP 5-148,658 does not specify the specific substrates and conventional steps of the process of manufacturing of integrated circuits recited by the claims.

However, the reference does not limit the disclosure to any specific substrate or step of the IC manufacturing.

It would have been obvious to an ordinary artisan at the time the invention was made to apply the method of JP 5-148,659 to any substrate having copper surfaces at any conventional step of IC manufacturing with reasonable expectation of adequate results.

5. Claims 3, 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 5-148,658 on view of Tsubai et al (US Patent NO 4,238,279).

JP 5-148,658 teaches a method for cleaning copper comprising application to copper surfaces of microelectronic packages a cleaning solution as claimed.

The cleaning solution comprises an inorganic acid(s) as claimed – sulfuric, phosphoric, etc.

The cleaning solution comprises persulfate salt as claimed – ammonium persulfate.

The solution comprises a phosphate salt, which, at the same time, a surfactant.

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The reference does not recite the specifically claimed phosphate salts.

Tsubai et al teach that what is semiconductor industry meant under a general disclosure of phosphoric acid also includes the claimed phosphate salts and their mixtures with different phosphoric acids. See entire document, especially column 2, line 60 – column 3, line 6.

It would have been obvious to an ordinary artisan at the time the invention was made to use any conventional mixture of phosphoric and phosphate in the method of JP 5-148,658 with reasonable expectation of adequate results.

As to claim 7, it would have been obvious to an ordinary artisan at the time the invention was made to find an optimum concentrations for the components of the solution in the modified method of JP 5-148,658 by routine experimentation inside of the disclosed by the prior art ranges.

6. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 5-148,658 ⁶ in view of Arabinick (US Patent NO 5,855,805).

JP 5-148,658 teaches a method for cleaning copper comprising application to copper surfaces of microelectronic packages a cleaning solution as claimed.

The cleaning solution comprises an inorganic acid(s) as claimed – sulfuric, phosphoric, etc.

The cleaning solution comprises persulfate salt as claimed – ammonium persulfate.

The solution comprises a phosphate salt, which, at the same time, a surfactant.

The reference does not recite the specific surfactant claimed.

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However, the claimed surfactant are all well-known and commercially available surfactants.

It would have been obvious to an ordinary artisan at the time the invention was made to use these surfactants in the method of JP 5-148,658 with reasonable expectation of adequate results in order to improve wettability of the solution.

On the other hand, Arabinick teaches that it was known to use the claimed surfactants in the methods for cleaning copper surfaces in manufacturing of IC.

It would have been obvious to an ordinary artisan at the time the invention was made to use the surfactants disclosed by Arabinick in the method of JP 5-148,658 for their primary purpose with reasonable expectation of adequate results because Arabinick teaches that the use of these surfactants improves the process.

Response to Arguments

7. Applicant's arguments filed 9/19/01 have been fully considered but they are not persuasive.

The Applicants argue that the JP reference teaches the use of nitric acid while this acid is eschewed by the applicant's invention.

This argument is more specific than the claims and not persuasive because the claims do not exclude nitric acid. It is noted that nitric acid is inorganic aid, and that inorganic acid is required by the claims. Moreover, it is noted that the reference discloses the use of nitric acid as one of the alternatives among other acids, such sulfuric acid (this acid is recited by the claims).

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Further, it is noted that in contrast to the applicant's arguments the method of the invention does not exclude the use of nitric acid. The specification discloses the use of this acid as suitable, although, not preferred. See page 13, lines 9-11 of the specification.

The Applicants also argue that the process of JP reference takes away too much copper. The Applicants, however, do not provide any evidence or cite any part of the reference to support their statement. The examiner was not able to find support for the applicant's statement in the reference. In contrast, the reference is directed to surface preparation not to removing copper.

The applicants argue that the cited references are old (10 and more years). This is not persuasive because the age of the reference does not change the teaching of the reference.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Markoff whose telephone number is 703-308-7545. The examiner can normally be reached on Monday - Friday 8:30 - 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on 703-308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7719 for regular communications and 703-305-7718 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0651.



Alexander Markoff
Primary Examiner
Art Unit 1746

am
December 3, 2001

ALEXANDER MARKOFF
PRIMARY EXAMINER